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NPN Silicon

2N4123
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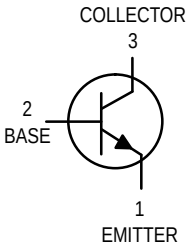

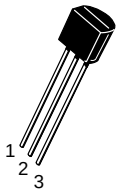

CASE 29–04, STYLE 1
TO–92 (TO–226AA)

MAXIMUM RATINGS

Rating	Symbol	2N4123	2N4124	Unit
Collector–Emitter Voltage	V_{CEO}	30	25	Vdc
Collector–Base Voltage	V_{CBO}	40	30	Vdc
Emitter–Base Voltage	V_{EBO}	5.0		Vdc
Collector Current — Continuous	I_C	200		mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	625 5.0		mW mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	1.5 12		Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–55 to +150		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	°C/W

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage(1) (I_C = 1.0 mAdc, I_E = 0)	2N4123 2N4124	$V_{(BR)CEO}$	30 25	— —	Vdc
Collector–Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	2N4123 2N4124	$V_{(BR)CBO}$	40 30	— —	Vdc
Emitter–Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)		$V_{(BR)EBO}$	5.0	—	Vdc
Collector Cutoff Current (V_{CB} = 20 Vdc, I_E = 0)		I_{CBO}	—	50	nAdc
Emitter Cutoff Current (V_{EB} = 3.0 Vdc, I_C = 0)		I_{EBO}	—	50	nAdc

1. Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2.0%.

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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

Characteristic		Symbol	Min	Max	Unit
ON CHARACTERISTICS					
DC Current Gain(1) (I_C = 2.0 mAdc, V_{CE} = 1.0 Vdc)	2N4123 2N4124	h_{FE}	50 120	150 360	—
(I_C = 50 mAdc, V_{CE} = 1.0 Vdc)	2N4123 2N4124		25 60	— —	
Collector–Emitter Saturation Voltage(1) (I_C = 50 mAdc, I_B = 5.0 mAdc)		$V_{CE(sat)}$	—	0.3	Vdc
Base–Emitter Saturation Voltage(1) (I_C = 50 mAdc, I_B = 5.0 mAdc)		$V_{BE(sat)}$	—	0.95	Vdc
SMALL–SIGNAL CHARACTERISTICS					
Current–Gain — Bandwidth Product (I_C = 10 mAdc, V_{CE} = 20 Vdc, f = 100 MHz)	2N4123 2N4124	f_T	250 300	— —	MHz
Input Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 1.0 MHz)		C_{ibo}	—	8.0	pF
Collector–Base Capacitance (I_E = 0, V_{CB} = 5.0 V, f = 1.0 MHz)		C_{cb}	—	4.0	pF
Small–Signal Current Gain (I_C = 2.0 mAdc, V_{CE} = 10 Vdc, R_S = 10 k ohm, f = 1.0 kHz)	2N4123 2N4124	h_{fe}	50 120	200 480	—
Current Gain — High Frequency (I_C = 10 mAdc, V_{CE} = 20 Vdc, f = 100 MHz)	2N4123 2N4124	$\|h_{fe}\|$	2.5 3.0	— —	—
(I_C = 2.0 mAdc, V_{CE} = 10 V, f = 1.0 kHz) (I_C = 2.0 mAdc, V_{CE} = 10 V, f = 1.0 kHz)	2N4123 2N4124		50 120	200 480	
Noise Figure (I_C = 100 μAdc, V_{CE} = 5.0 Vdc, R_S = 1.0 k ohm, f = 1.0 kHz)	2N4123 2N4124	NF	— —	6.0 5.0	dB

1. Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2.0%.

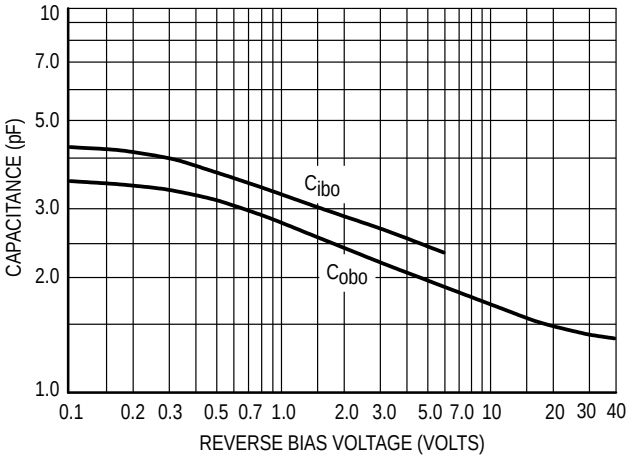


Figure 1. Capacitance

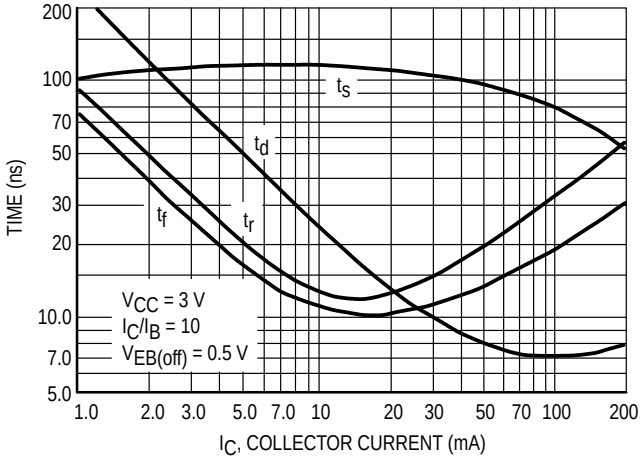


Figure 2. Switching Times

AUDIO SMALL–SIGNAL CHARACTERISTICS

NOISE FIGURE

(V_{CE} = 5 Vdc, T_A = 25°C)
Bandwidth = 1.0 Hz

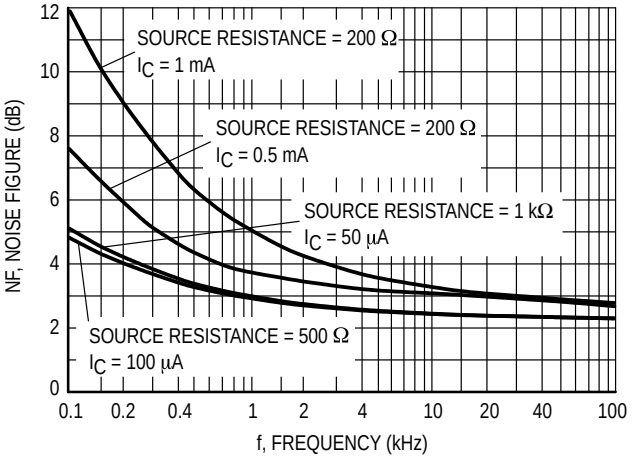

SOURCE RESISTANCE = 200 Ω
IC = 1 mA
SOURCE RESISTANCE = 200 Ω
IC = 0.5 mA
SOURCE RESISTANCE = 1 kΩ
IC = 50 μA
SOURCE RESISTANCE = 500 Ω
IC = 100 μA
NF, NOISE FIGURE (dB)
f, FREQUENCY (kHz)

Figure 3. Frequency Variations

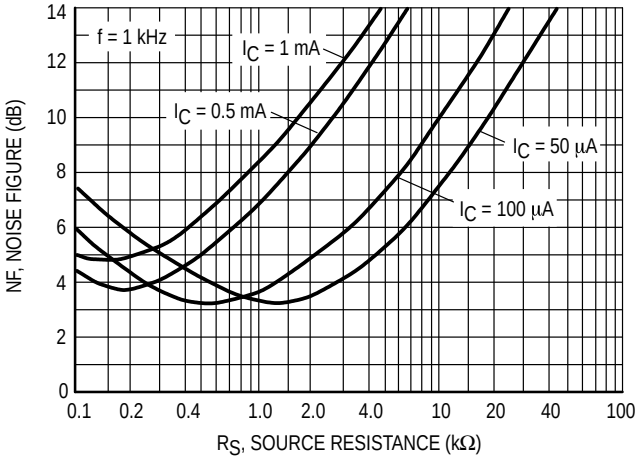


Figure 4. Source Resistance

h PARAMETERS

(V_{CE} = 10 V, f = 1 kHz, T_A = 25°C)

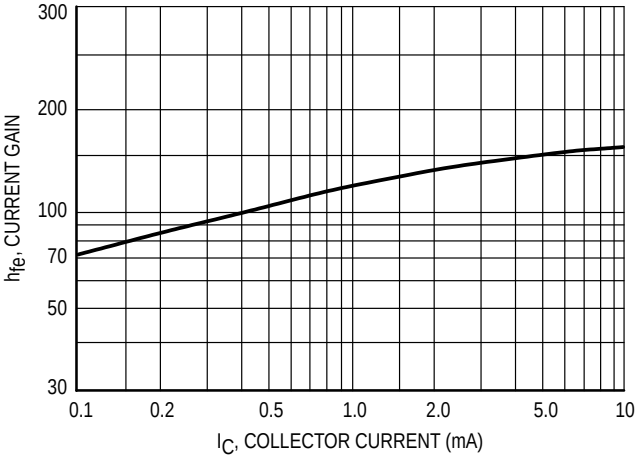


Figure 5. Current Gain

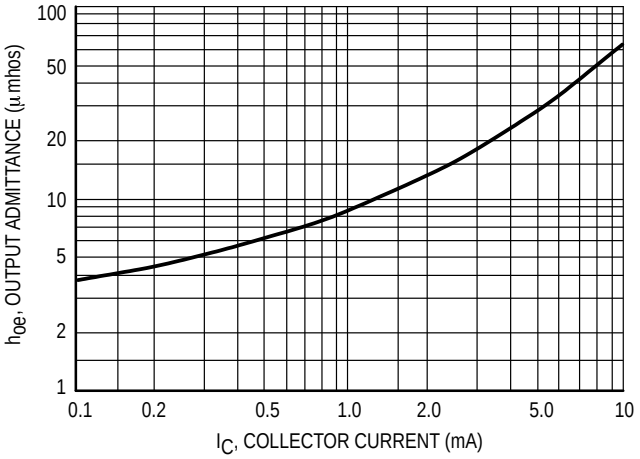


Figure 6. Output Admittance

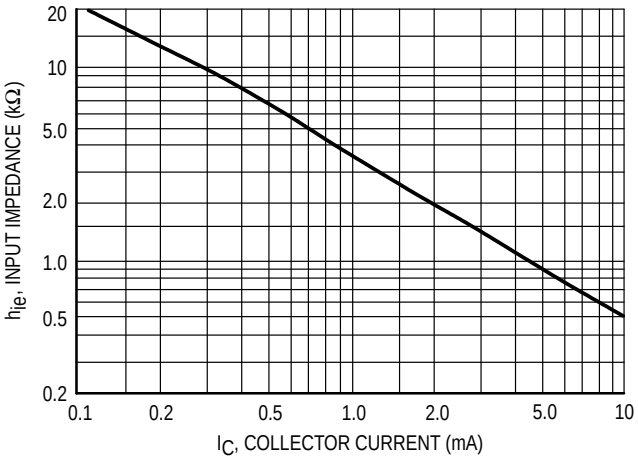


Figure 7. Input Impedance

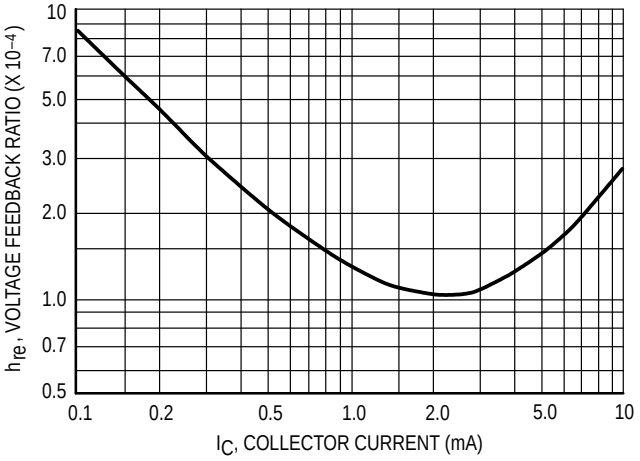


Figure 8. Voltage Feedback Ratio

STATIC CHARACTERISTICS

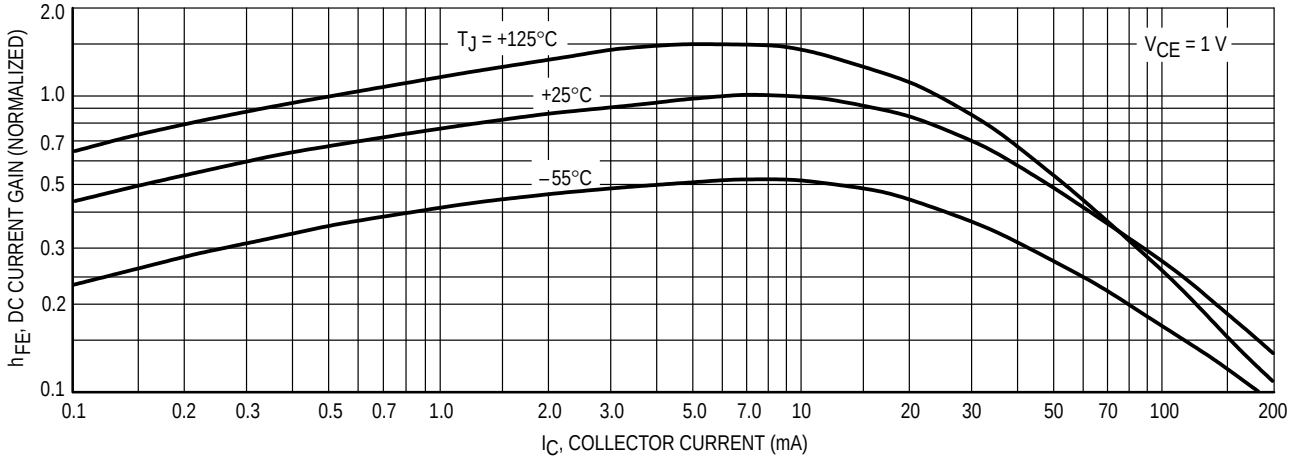


Figure 9. DC Current Gain

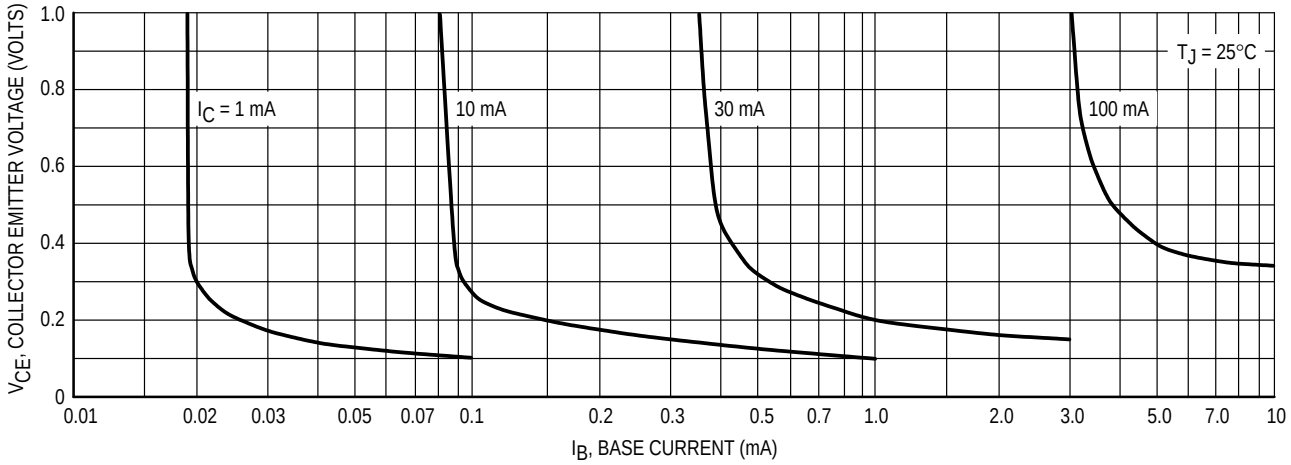


Figure 10. Collector Saturation Region

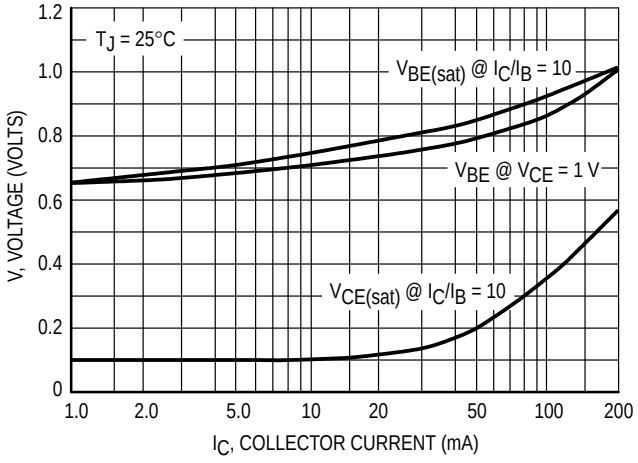


Figure 11. “On” Voltages

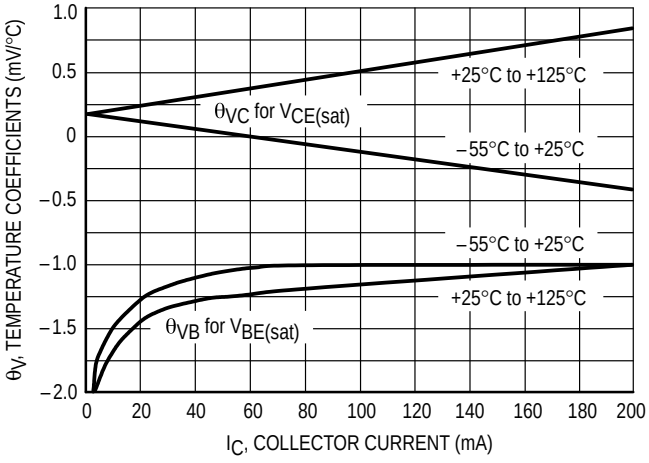
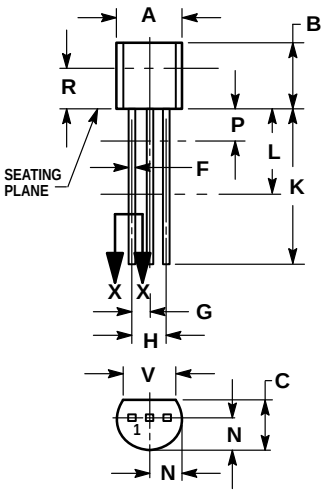
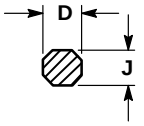


Figure 12. Temperature Coefficients

PACKAGE DIMENSIONS





SECTION X–X

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.022	0.41	0.55
F	0.016	0.019	0.41	0.48
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	—	12.70	—
L	0.250	—	6.35	—
N	0.080	0.105	2.04	2.66
P	—	0.100	—	2.54
R	0.115	—	2.93	—
V	0.135	—	3.43	—

CASE 029–04
(TO–226AA)
ISSUE AD

STYLE 1:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

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